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ABSTRACT

This study was conducted to ascertain the validity of persistent and widespread reports of a surplus of highly educated manpower. The results of the study are both optimistic and pessimistic. There seems to be no particular danger of a fundamental surplus in the output of B.A.'s in the 1970's, but we are entering a period of surplus of elementary and secondary school teachers. A definite surplus of master's degrees and Ph. D.'s is also evident, and persons obtaining doctoral degrees with the intention of becoming college professors are in for a rude awakening upon graduation. This surplus, however, is not projected to cause a massive state of unemployment. Rather, underemployment is a much more qualified term for what is predicted. Persons holding higher education degrees will be able to find jobs, but their qualifications may far exceed the skills demanded by the labor market. (HS)

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THE SUPPLY AND DEMAND FOR GRADUATES OF HIGHER EDUCATION: 1970 to 1980

by

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THE SUPPLY AND DEMAND FOR GRADUATES OF HIGHER EDUCATION: 1970 to 1980

I.

INTRODUCTION

There are persistent and widespread reports of a surplus of highly educated manpower. Corporate personnel departments' visits to college campuses declined sharply the past two years. College graduates are reporting great difficulty in finding employment. Many M.A.'s are experiencing similar employment problems, while even larger proportions of Ph.D.'s are finding themselves in a glutted market. And most serious of all, there appears to be a large and growing surplus of elementary and secondary school teachers.

A major problem in assessing the nature and duration of this manpower surplus is to distinguish the longer term, fundamental manpower imbalances from the shorter term, recession induced imbalances. For instance, in a year when General Motors and Prudential Insurance is each hiring only 500 new B.A.'s,* it is not surprising that many B.A.'s are having difficulty finding jobs. Nonetheless, it is not possible to dismiss all of the current surplus of highly educated manpower as a direct result of the recession. It is necessary to "look underneath" the recession to see if it is exacerbating a more chronic skilled manpower surplus.

The conclusions of this investigation can be briefly summarized.

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* Time Magazine, May 24, 1971, p. 50.

(1) The unemployment rates for college graduates, teachers, and Ph.D.'s are quite low. (2) The more education a person has, the less likely he is to experience unemployment. This has been true in the past, and we see little likelihood of its changing in the future. (3) It seems clear that when the number of jobs that require highly educated workers is less than the supply of such workers, the "surplus" workers are usually able to find other jobs. We would describe this surplus as being "underemployed": their work does not require the full utilization of their skills and training. Unfortunately, a workable or empirical definition of underemployment has proved most elusive, greatly restricting the range of conclusions one can draw about present or potential surpluses of highly educated manpower. (4) Because of this lack of clarity or precision in defining underemployment, we find it most difficult to reach very firm conclusions about potential surpluses of B.A.'s and Ph.D.'s; it seems clear that there will be a demand for their service, but it is very unclear how effectively their training will be utilized. (5) Despite such ambiguities, we are certain that if the proportion of Ph.D. candidates who desire or anticipate careers in college teaching follows past trends, there are going to be very many disappointed would-be faculty members. (6) Similarly, if the proportion of college graduates who desire careers in teaching follows past trends, there will be enormous numbers of disappointed potential teachers. (7) One of the most publicized and "spectacular" current manpower surpluses has been experienced by highly skilled and trained scientific personnel who have been employed in the aerospace and military hardware areas. These scientists and engineers have apparently suffered this unemployment as the result of simultaneous cutbacks in federal research and development expenditures, and cutbacks in NASA, military, and SST expenditures. At least some increased unemployment would be expected for such specialized workers at a time when federal monies are being reallocated away from their area of specialization--even if it did not coincide with a recession. The recession, of course, makes it all the more difficult for them to find new employment.

II.

THE IMPACT OF RECESSIONS ON ACADEMIA

Before we go into a somewhat detailed look at the supply and demand projections for B.A.'s, Ph.D.'s, and teachers, some observations on future patterns of unemployment during recessions should be made. During a recession, companies seek to delay all postponable expenditures. New investments have usually been a major element in this category. Historically, the most severe effects of recessions have been on construction, investment in new productive facilities, and other durable goods. The economy of the 1970's and 1980's will be marked by much greater cyclical unemployment of scientists and engineers, and others in the software, long-term capital sectors. This will become a more serious social problem as the size of the nation's research and development effort grows, for it will mean a larger number of individuals will experience dislocation and unemployment. And the hardest burdens will fall on those with skills least easily transferred to other activities, and those who have most recently entered the labor force.

This increased sensitivity of research and development expenditures has very direct implications for higher education. In the post-war years, institutions of higher education have increasingly served as auxiliary research wings of corporations and government. Until 1969-1970 the relationship was one of mutual benefit. The institutions of higher education served, in effect, as the "Kelly Girls" of the research area. They provided an elastic supply of highly trained and well equipped research talent which became available almost on demand. However, unlike an in-house research department, these research "wings" did not represent a fixed cost in terms of facilities, salaries, and fringe benefits. That is, when no longer needed, academic researchers could be dispensed with

fairly easily. In effect, considerable business and budget risk was shifted from government and industry to academic institutions. A major result of this is that academic institutions, which once were fairly well insulated from the effects of the business cycle, now must expect to be increasingly influenced by changes in the levels of economic activity.

III.

THE NATURE OF LONG-TERM, SKILLED MANPOWER PROJECTIONS

Before reviewing and summarizing the various projections which have been made on the supply and demand for B.A.'s, teachers, and Ph.D.'s, it is important to note several general points that apply to all three of these manpower categories.

A. Long-Term Projections of Skilled Manpower Surpluses

Forecasts which anticipate continuous surpluses of educated persons must be viewed with considerable skepticism. To be credible, they must provide an answer to the question: why would individuals continue, year after year, to seek the costly and often grueling training required, especially that for a Ph.D., if it was apparent that many of them would be unable to find employment which satisfactorily utilized that training? Short-term oversupplies of educated persons seem a reasonable possibility or expectation, since there clearly are time lags in the adjustment of supply and demand. But this lag is probably of about two or three years duration and certainly would not apply to ten or fifteen year forecasts. Moreover, while we might allow for the possibility of ignorance and misinformation in leading to a chronic oversupply in some occupations, the fact that we are here dealing with <u>educated</u> manpower would seem to preclude <u>that</u> explanation or basis for a chronic oversupply.

Very few current and recent forecasts deal with this very fundamental question. For the most part, these forecasts were based upon trend extrapolation of some form. Supply and demand of skilled manpower were projected separately and without interaction. This is simply not a reasonable or legitimate basis for forecasting. It assumes that people act without reference to past and present experience, not to mention future expectations. We should hasten to add, however, that it is not impossible for a continuous or long-term oversupply of Ph.D.'s to occur. It is possible. And it is possible to make a reasonable and legitimate forecast which anticipates such a development. But some rationale must be provided to explain why people and institutions do not respond to the year after year oversupply in some way that reduces or eliminates it.

There are a number of reasons why a surplus of highly educated workers might persist for a long period of time. Several of these are summarized here. First, there is the possibility that, although it is common knowledge that there have been and are too many B.A.'s, teachers, or Ph.D.'s, a sufficient number of applicants for training in these areas feel that they individually will "make it," so that the surplus persists. Although undeniably possible, this seems rather unlikely.

It seems more likely that the more "marginal" (in terms of ability and commitment) students would tend to become discouraged, and abandon their programs. Even now, some of the better doctoral candidates and applicants to schools of education are becoming discouraged. And given the lengthy training period involved, this is likely to be a considerable damper on the supply of teachers and, especially, Ph.D.'s. Furthermore, there are constant demands in academic departments for "upgrading" the quality of their programs. Most often this really means getting better students and/or raising the requirements for attaining the degree. Departments faced with difficulty in placing their graduates in "satisfactory" employment are almost certain to find such "upgrading" more tempting, if not, simply, the only fair and reasonable thing to do.

There exists what might in shorthand be called a "market mechanism" which tends to equate supply with demand--a mechanism which includes the responses of potential students, counselors, faculty and administrators, and others to surpluses or shortages.

There are several other rationales for a long-term surplus of highly educated personnel that involve unusual circumstances. For instance, it is possible that such a surplus exists and persists because the absolute demand for personnel in a certain field may fall at a rate exceeding the rate of death and retirement of existing jobholders. Another possibility is that the forecasts of demand for such workers are continuously in error. Although manpower forecasts have approximated "continuous error," they have tended to fluctuate between overestimation and underestimation.

There is, however, one other possibility which is not so easily dismissed. It is based upon the fact that highly educated people--even when there is a surplus of them in their fields of specialty--find better jobs than they could without a degree. Those seeking specialized jobs in fields which are experiencing manpower surpluses must accept either a <u>probability</u> of unemployment or underemployment, or a <u>period</u> of unemployment or underemployment. That is, new students enrolling in specialized courses of study in which there is already a surplus of personnel do not confront lifelong unemployment. Depending on market conditions, such a student may tell himself:

(1) I have a 75% chance of landing a job in my chosen field and in any case I will get some kind of job which is probably better than I could get without the degree; or,

(2) With my degree I may face unemployment or serious underemployment for six months to a year before getting a job in my field.

In spite of a personnel surplus, if the absolute number of jobs grows, or if there is any attrition at all, students may voluntarily accept unemployment

or underemployment as the price of getting into a desired field.

Thus, it appears that the only very likely condition under which a chronic surplus of educated persons could persist would be where it was, in effect, voluntary. Ironically, this appears to be the case with educated persons in some underdeveloped countries, including India.* Economic and other advantages accruing to educated persons are so great, relative to the costs of obtaining an education (a publicly subsidized cost) in a number of professional fields, that a chronic surplus of persons in particular skill categories could persist. We do not suggest that this "explanation" will necessarily apply to the United States. Rather, our argument is only that such a chronic surplus is in fact possible, and that were it to come into being, it would be voluntary on the part of those constituting the oversupply, and would be financed in large part by public expenditures.

A further explanatory note is perhaps necessary. We do not see a chronic involuntary oversupply of skilled manpower as at all likely. Thus, for example, we heavily discount some projections we have heard which forecast 500,000 to 600,000 unemployed teachers by 1975, rising to a level of about 1,000,000 by 1980. Developments such as this, without countervailing adjustments, we see as unrealistic and untenable. But such forecasts--based on independent trend analyses of supply and demand--do serve to indicate the scale of the adjustment process which must and will be undergone in bringing supply and demand into some sort of balance. That is, the size of the spread between independently estimated supply and demand is an index of the magnitude of the adjustment problem.

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*See Mark Blaug, Richard Layward, and Maureen Woodhall, The Causes of Educated Unemployment in India, forthcoming.

B. Unemployment and Underemployment

No one, to our knowledge, has suggested that skilled manpower is likely to confront serious levels of chronic unemployment. The serious problems of unemployment are borne almost exclusively by individuals with low educational attainment. Short of a major depression, we see no change in this condition. Although some B.A.'s, M.A.'s, and Ph.D.'s are unemployed, and although it is doubtless true that their rate of unemployment rises when they are in oversupply, this unemployment rate in no sense adequately measures the extent or the nature of the problem. First, for every highly skilled unemployed individual there may be four or five other highly skilled individuals who managed to avoid unemployment by becoming underemployed: accepting jobs that do not directly or fully utilize their skills.* Unemployment rates, then, will understate the extent of the problem. Second, use of unemployment rates is misleading about the nature of the problem simply because underemployment, not unemployment, is the major problem confronting surplus, highly skilled workers. What is usually called an oversupply of educated persons might better be called a supply of overeducated persons.

In a methodological sense, it is unfortunate that unemployment is not the appropriate index, for it is extremely difficult to measure underemployment. The concept is filled with definitional ambiguities. In his recent book on this subject, Ivar Berg** finds that by using one set of

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*There is another definition of underemployment which is based upon the number of hours worked per time unit that is less than some norm (such as 40 hours per week or 2000 hours per year). We prefer to call this recurrent unemployment defining an "underemployed" individual as one who works the "normal" number of hours, but at a job for which he is "over-qualified."

**Education and Jobs: The Great Training Robbery, Prager, N.Y. City: 1969.

assumptions about skills required for specific job categories it is possible to conclude that there is massive overtraining of American workers. But, using only slightly different assumptions about such job requirements, he is led to the conclusion that there is little or no such overtraining. Berg did discover, less ambiguously, that among workers performing the same job, those with less education were frequently more productive than those with more education. It can be hypothesized that this was due to the greater frustration or lessened challenge of the work for the more highly educated workers. But other explanations are equally possible, such as the irrelevance of much of formal education to job performance. This issue, too, remains problematic, although the sympathies of Berg are evident in the subtitle to his book: "The Great Training Robbery."

It seems evident that no one fully utilizes his skills, training, and ability during all of his work hours. Given this, we are left with deciding what portion of a worker's time requires his full (or nearly full) productivity if he is not to be considered underemployed. And if we then, in a seemingly "generous" mood, decide that a worker need operate at or near his maximum only half the time, we will be forced to conclude that most faculty members are underemployed. We might also find that some 90% of the entire work force is underemployed.

We might then try a different tack, defining the fully-employed worker as one whose job <u>requires</u> full utilization of his capacities <u>at least occasionally</u>, and who would be unqualified for the job if he were incapable of this at least sporadic peak performance. This sort of definition is probably realistic in its description of the utilization of training and skills in most jobs, yet it does not appear to lend itself very readily to use as an empirical criterion for determining underemployment. It leaves unanswered such critical questions as: what constitutes such peak performance? Is one such peak performance per year frequent enough to describe the job as "requiring" skills and abilities to meet that need?

How about two, three, or four times per year? How can we tell which skills learned in formal education are necessary for meeting such full-capacity requirements?

Clearly it was not our purpose in this section to "nail down" the meaning of underemployment. On the contrary, it may appear that our comments have served only to make a confusing issue even more problematic. To this we can only say that the issue is problematic and largely unresolved, despite its centrality to the question of overproduction or underproduction of skilled manpower.

C. Credentialism

The problem of credentialism is inextricably linked to the problem of underemployment. The ethic that "education is good and more education is better" is a deeply ingrained social norm. It is widely assumed that, other things being equal, the more educated worker is the better worker. For certain jobs this is unassailable. But for a large number of jobs it is suspect; in others it is clearly not the case, as Berg's findings indicate.

In part, the problem of credentialism is an education-based one. It is in the interest of the educators that education be highly valued. But credentialism is also very largely an employer-based problem. As long as employers place a high value on educational credentials per se, the problem will remain. It may be, however, that employers are beginning to question the merits of educational certificates. Many employers claim that they have been aware that, for many positions, the skills learned in education are either not relevant or are more than needed to perform the job tasks. Instead, they claim to have been using educational attainment as an indicator of other, less easily measured, personal traits, such as persistence, responsibility, common sense, imagination, and so forth.

Ivar Berg's findings along with the findings of others may signal the beginning of a re-thinking of these assumptions by employers. There is considerable stimulus for employers to make such reassessments, since the more highly educated workers command higher salaries.

Nonetheless, there is a very real danger that the employment market will continue to use educational credentials as a somewhat arbitrary device to ration scarce jobs. It seems possible, perhaps likely, that one of the major consequences of increasing educational attainment is that defined educational requirements of jobs rise at a more rapid rate than actual educational requirements of jobs. And this, especially, is a major possible consequence of excess supplies of highly educated individuals.

D. Time Lags in the Response of Supply and Demand to Disequilibrium

We have contended that there exist what we have called "market mechanisms" which tend to equilibrate supply and demand. Since a number of these mechanisms could respond just as easily to forecasts of surpluses as to actual surpluses, the question arises as to whether actual surpluses ever need occur. Unfortunately, the adjustment mechanism takes time to effect. In the case of skilled or educated manpower, that time appears to be considerable. Indeed, with the exception of gross and obvious imbalances between supply and demand, the time required for the market mechanism to respond to knowledge or forecasts of a coming imbalance is probably greater than the time into the future we can accurately predict such an imbalance. Moreover, wishful thinking probably makes us less willing to react to forecasts than to crises at hand.

What is the probable length of this response lag? The answer must be based primarily on a priori reasoning, since "hard data" are lacking. This is mentioned for reasons of precision, not as a disclaimer. Despite the lack of numerical documentation or support, we are extremely confident that

the general thrust of our observations on lags in the response of the supply of trained manpower to a situation of excess supply is correct. The lack of data, however, prevents us from being able to make precise estimates of the duration of the lags.

A further clarification also seems warranted. In the following discussion we refer to "time lags" as if they were delayed effects or responses which occur some specific time, all at once, after the original cause of the response. In all but the most unusual circumstances this is a gross simplification. Actually, the supply-response is spread out over a number of time periods. Frequently it is possible to estimate the proportion of the total response that occurs in each of these time periods. For instance, 25% of the total response might occur in the first year, 50% in the second year, and 25% in the third year after the original stimulus for the response. In the case at hand, however, we lack the wherewithal to make such estimates, and speak in rather gross terms of an "average" or "weighted average" time lag.

There appear to be at least several sources of lags in the response of supply to an existing or forthcoming surplus. These are listed and described below. It should be noted that many of the lags discussed would apply whether a surplus or a shortage were the problem.

1) Forecasting-Awareness Lag. Forecasts themselves take time to prepare. In a bureaucratic setting they probably take longer than in a non-bureaucratic setting. Decisions have to be made on whether or not to conduct the forecast. Prior to this, there must be some reason for suggesting that there might be a forthcoming problem.* If original data must be collected, the forecast can take as much as a year to produce. Even then,

*Only with some sarcasm aforethought do we suggest that the most common reason for suspecting that there is a "forthcoming problem" to be examined is that the problem is already a current reality. This study itself is, in part, a case in point.

there is a further lag or delay while the relevant public (students, colleges, administrators, legislatures, and so forth) becomes aware of the projections. And it takes still longer for these "publics" to digest and weight the projections. Frequently, the projections can be criticized and ignored--especially if it does not conform to the wishes or hopes of the readers. Few projections, especially the longer-term ones, are so compelling in their methodology and conclusions that they are free from this treatment. It must be added that many projections have been quite wrong, and so there is ample grounds for legitimately (objectively) or illegitimately (because they are unpleasant) discounting them. But even with the most unambiguous, certain, and short-term forecasts, it still takes quite a while for students and institutions simply to become aware of the coming market imbalance. We need look no further than the contemporary experience with the surplus of primary and secondary teachers. Some students and schools of education still appear to be relatively oblivious to the now widely publicized alarms.

2) "Sunk Costs." A major source of delay in the response of supply to a surplus situation is that students, colleges and universities, and educational bureaucracies develop both emotional and financial stakes in their future plans, and find it difficult or undesirable to change them even when they are aware that they are on a collision course. In some cases this is quite rational. Take, for example, the case of the student who has completed all of his coursework for a Ph.D. and who is fully aware that there will be a surplus of Ph.D.'s in his field by the time he finishes his dissertation one or two years hence. It may still be quite profitable, even in strictly financial terms, for him to continue and finish the dissertation. It may well be that it is only the first or second year graduate student for whom continuation in a doctoral program is irrational. In this case, there would be about a two or three year lag in the response of Ph.D. students to an existing or anticipated oversupply of Ph.D.'s. And this lag would have to be added to the "forecasting-awareness" lag to obtain the total "lag effect."

Colleges and universities often find themselves in a similar situation. First, it is very difficult to cut back programs. Doing so often involves decreasing the size of the faculty, a very painful move which is avoided if possible. Institutions of higher education prefer, if at all possible, to make faculty reductions through the "natural" processes of death, retirement, and voluntary departure to other jobs. Furthermore, programs and departments develop strong lobbies for their continued support and funding within the educational institution. Colleges and departments within them are very much captives of their own quaint notion that prestige and stature are correlated with size. All of these considerations act to delay the responsiveness of academia to a surplus of its products, in part because they do not wish to admit that there is a problem, even, perhaps, to the point where they ignore it until they actually collide with it, and in part because they wish to "weather the storm" with their staffs and programs intact. In this last consideration colleges and universities are much like business corporations: they resist dismantling or "downgrading" programs, many of which have taken considerable time, effort, and dedication to assemble. Their natural--and to some extent sensible--reaction is to try to "hold-on" and "make-do" in the hopes that others will do the painful retrenching or that the whole thing will soon "blow over."*

There is also a further administrative reason why academic institutions (or, for that matter, any organization) finds it difficult to respond quickly to a change in the demand for its product. Plans are generally formulated several years in advance, and it is often difficult to alter them. It is not just that agreed upon plans have a momentum of their own, though this frequently appears to be the case, but also that it simply takes time to develop new plans. When the new plans involve the allocation

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*For a more detailed treatment of academia's response to situations where they are confronted with the prospects of cut-backs in their programs, see especially Earl Cheit, The New Depression in Higher Education (New York: McGraw-Hill, 1971), and Lewis B. Mayhew, Graduate and Professional Education, 1980 (New York: McGraw-Hill, 1970).

of cutbacks among various constituent and, perhaps, competitive programs, the re-planning process takes even longer.

Concerning the "avoidance of unpleasant reality," Earl Cheit has estimated a time lag in excess of two years by academic institutions. He refers first to a study conducted by the American Association of University Professors in 1937 on the response of academic institutions to the market crash in 1929 and the ensuing depression. In this report the authors concluded:

> By 1930-1931 it was evident that the economic disturbance was more than a mere market phenomenon. Yet in 1931-1932 the educational institutions were not adapting themselves with any rapidity to the prevailing conditions . . . *

Referring to the results of his own detailed examination of the responses of colleges and universities to the present financial crisis, Cheit concludes:

> Twenty-five years later, under somewhat similar circumstances, we found little evidence to indicate that this two-year lag has been reduced, and some indication that it may even be longer.**

There may also be similar sorts of responses on the part of public administrators who have developed vested interests and personal attachments to particular programs. Likewise, there are--apparently inevitable--delays of a "bureaucratic" nature in the responsiveness of public agencies in making changes in programs and projects whose function has become obsolete or even counterproductive.

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*American Association of University Professors, Depression, Recovery and Higher Education (New York: McGraw-Hill, 1937).

**Cheit, op. cit., p. 16.

3) Legislative Delays. When changes in legislation are required to respond to an imbalance between supply and demand, the delays or time lag can be of considerable duration. First, legislatures, like bureaucracies, usually take a long time in doing anything. Even a bill for which there is widespread support can take a year or two to become law. But when there is some fundamental opposition or divisiveness within the legislature, and more especially, when there is a powerful lobby opposing the new legislation, the needed reforms can take much longer, and it is quite possible that they fail altogether.

E. Effects of Supply Upon Demand

It is intuitively obvious that there will be some kind of response, however lagged, of supply (enrollment in school, choice of curricula) to apparent shortages or surpluses of various categories of educated manpower. What is less obvious, though perhaps just as important, is that demand also responds to supply, both in the short and especially the long run. The way demand for educated manpower may be influenced by the available supply is worth discussing, not only because it bears on the plausibility of independent projections of supply and demand, but also because it sheds further light on the credentialism phenomenon, and on the concept of underemployment.

The following example is illustrative of the process. We do not suggest that the manner by which supply influences demand will be uniform in all cases.

1. Assume an excess supply of educated persons of a particular degree or credential category--e.g., Ph.D.'s in history, or Certified Public Accountants (CPA's). Here, "excess supply" is used in the market sense: the number of job applicants holding those credentials exceed personnel sought holding those credentials. Let us further assume that holders of

those credentials have, on the average, learned skills and abilities which are greater to a statistically significant extent than those with inferior credentials--history M.A.'s, or non-CPA accountants with B.A. degrees.

2. As noted earlier, with respect to labor markets, an oversupply of educated persons really means a supply of overeducated persons. That is, assuming reasonably full employment in the overall economy, some history Ph.D.'s and CPA's will take jobs for which those credentials--and the associated skills--have not theretofore been required. The CPA's can take a great many accounting or a number of teaching jobs; the historians may teach in junior college or high school.

3. Unless there is a dovetailing shortage of junior college historians, accountants, etc., the overeducated persons who take these positions will thereby "bump" those with theretofore adequate credentials for these positions. One effect will be to create the appearance of an excess supply of other (less) educated persons, such as history M.A.'s, or non-CPA accountants.

4. While persons with advanced degrees and credentials, and associated skills, may hold jobs for which those degrees, credentials and skills are not necessary, it would be surprising if occasions never arose when they had opportunities to make valid use of them. Gradually, over time, the need for these skills and credentials can get built into the job routine. What can happen is de-specialization of function: where formerly, tasks requiring skills and credentials would be performed only by a few upper-level professionals with specialized job titles, when a number of persons with modest job titles also have such skills and credentials, office routine changes, and there results a gradual and subtle change of job descriptions. To oversimplify, instead of 10% of an office force needing advanced-degree skills all the time, perhaps 20% need them half the time, or, at the extreme, everyone needs them 10% of the time.

5. So jobs held by these surplus Ph.D.'s, CPA's, etc., come to "require" those credentials--in the sense that replacement of our originally overeducated manpower would require others of similar high credentials. There can be an upgrading of the skills and credentials required for a large number of jobs, with no increase at all in the skill requirements of the overall labor force, simply through de-specialization.

Another, more mundane example will help make the point. A utility company decides to require a high school diploma of its service crews. To the utility company, the requirement is just a job-applicant-rationing device, necessary because the number of applicants exceeds the number of available openings. The content of the job does not require the skills provided in connection with a high school diploma. But, over time, as all service-crew workers have high school diplomas, the use of verbal, quantitative, and other skills provided in high school gradually becomes part of the job.

There are two main points to make about this process.

First, the educational requirements of a job are a function both of the work to be done, and of the organizational arrangements--division of labor and specialization--for doing that work. In the present-day United States, we could presumably rearrange work assignments, economizing on the time of the very skilled, and get effects similar to a major leap forward in average educational attainment. Such an arrangement presupposes a hierarchical, almost Brave New World kind of manpower arrangement. Routine and undemanding work would be concentrated among less skilled and educated persons. The opposite system, under which everyone could do some interesting and challenging work, where everyone needs an advanced education 10% of the time rather than 10% of the population needing it 100% of the time, requires higher average educational levels. One would not necessarily want to call the second system a situation of "oversupply of educated persons."

The second point is the one with which we began this discussion. Requirements adjust to the characteristics of the people available. If independent estimates of future demand and supply of some type of educated manpower indicate large and chronic surpluses, our argument would be that some who otherwise would have taken up that study will change their minds (effect of demand upon supply), and the educational requirements of some jobs will change so as to employ additional numbers of those educated manpower (effect of supply upon demand). And though we referred above to the distinction between <u>defined</u> and <u>actual</u> educational requirements of jobs, that distinction can never be clear-cut, since defined requirements readily become actual requirements.

IV.

SUPPLY AND DEMAND FOR B.A.'s, TEACHERS, AND PH.D.'s: 1970-1980

We now examine, in turn, the potential surpluses of college graduates, schoolteachers, and Ph.D.'s.

A. College Graduates

There appear to have been very few projections of the supply and demand for college graduates. This seems surprising given the large number of individuals involved--there were some 816,000 new B.A. recipients last year, and the number is growing each year. The one major study of which we are aware was prepared by the Bureau of Labor Statistics (BLS) in the U.S. Department of Labor.* Similar studies, based upon similar

*College Educated Workers, 1968-80: A Study of Supply and Demand, Bulletin 1676, U.S. Department of Labor, Bureau of Labor Statistics, 1970.

assumptions, and resulting in similar conclusions, were conducted in the U.S. Office of Education by Joseph Froomkin.* The conclusions of both the BLS and Froomkin studies were that the aggregate supply and demand for B.A.'s appear to be in approximate balance through the 1970's. If these studies are correct, then the unemployment and underemployment difficulties experienced by recent college graduates are in large measure a result of the, presumably, short-term recession the economy has been experiencing.

The BLS study begins with the Office of Education's projections of degrees awarded.** It then develops its own separate projections of the demand for new workers who have attained at least a college degree. These demand projections are based upon the extremely elaborate BLS models of the economy which include projections of GNP, size of labor force, industry by industry output, and other economic variables. The BLS then uses trend analysis to estimate the proportion of workers of different job categories who will be needed to produce these levels of output. Table I presents in disaggregated form some of the major conclusions of the BLS occupational forecasts.

The major problem here--and it is unavoidable--concerns the assumptions made about the relationship between jobs and education. As was discussed earlier with reference to underemployment, no one really knows what the "true" relationship is between job performance and educational attainment. Nor is it very easy to construct methods for making this determination, much less actually to make such estimates for a work force and "job pool" of more than 80 million persons of extremely diverse types of skills,

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*Joseph Froomkin, "Approaches to Forecasting Demand for College Graduates and Ph.D.'s (mimeo). Paper presented at the Association of American Universities meeting on the overproduction of Ph.D.'s, Washington, April 2, 1971.

**National Center for Educational Statistics, U.S. Office of Education, Projections of Educational Statistics.

TABLE I

OCCUPATIONAL EMPLOYMENT, 1968 AND PROJECTED REQUIREMENTS, 1980
FOR COLLEGE GRADUATES

Occupation	Estimated 1968 employment	Projected 1980 requirements	Percent change	Supply estimated to be
Chemists	130,000	200,000	55.7	Significantly below requirements
Counselors	71,000	107,000	49.8	
Dietitians	30,000	42,100	40.3	
Dentists	100,000	130,000	31.7	
Physicians	295,000	450,000	53.1	
Physicists	45,000	75,000	63.9	
Engineers	1,100,000	1,500,000	40.2	Slightly short of requirements
Geologists and geophysicists	30,000	36,000	20.6	
Optometrists	17,000	21,000	23.5	
Architects	34,000	50,000	47.1	In balance with requirements
Lawyers	270,000	335,000	22.7	
Pharmacists	121,000	130,000	7.0	Slightly above requirements
Mathematicians	70,000	110,000	60.5	
Life scientists	168,000	238,000	40.8	Significantly above requirements
Teachers, elementary and secondary	2,170,000	2,340,000	7.8	

Source: Bureau of Labor Statistics, op. cit., p.1.

abilities and requirements. And, as Berg points out, a slight change in assumptions concerning the relationship between jobs and education can convert a forecast of a considerable shortage of college educated workers into one of a sizeable surplus.

The BLS appears more or less to accept current employment practices and criteria, whatever their reasonableness, validity, or merit. They then assume that these will continue throughout the period covered by their projections. This assumption is very convenient, since it means they do

not have to deal with the relationship between work performance and educational attainment.

This "convenience" may be gained at a considerable cost. It may be acceptable from the point of view of the Department of Labor to work on a "revealed demand" basis. But it is highly questionable whether this is an adequate framework of analysis for the federal government as a whole which must justify its sizeable expenditures in terms of public benefit. Surely the federal government cannot ignore the possibility that millions of dollars of its educational budget is devoted to over-training the American work force.

Some further comments and criticisms should be made concerning the methodology employed by the BLS in constructing these projections. First, we discussed earlier the problems inherent in forecasts which make separate projections of supply and demand; they do not take into account the interaction and adjustment which occurs when supply and demand are out of balance. This criticism for the most part, however, does not apply to the BLS study. Although it is true that the BLS constructed separate estimates of supply and demand, it is also true that since their results happened to indicate no appreciable divergence between supply and demand, the sources of interaction and adjustment are largely absent.

Some criticisms might be directed at the assumptions underlying the demand projections. First, as we understand it, these projections are based upon the assumption that the unemployment rate will be in the range of 3% to 4% for the period 1970 to 1980. This seems remarkably optimistic, especially when it is coupled with the further assumption that economic policies will be able to "achieve a satisfactory balance between low unemployment rates and relative price stability without reducing the long-term economic growth rate."* To our knowledge, which includes familiarity with

*Bureau of Labor Statistics, op. cit., p. 2.

current economic research in this area, no one has yet come very close to discovering how to accomplish this. And if this is unattainable, it would in all likelihood mean that, other things equal, actual demand for college graduates would be lower than forecasted by the BLS.

A second problem is that the projections do not deal with those who receive less than four years of college education.* All projections with which we are familiar, quantitative or impressionistic, see the rapid expansion of two year colleges as a virtual "given" for the coming decade. What impact this will have on demand for the employment services of B.A. recipients is as yet unclear.

One very important change in the employment value of a B.A. should be emphasized. As more workers earn bachelor degrees, an increasing number of jobs will be defined as <u>requiring</u> a B.A., at the same time that a B.A. will become <u>increasingly necessary</u>, at the same time that it becomes <u>less sufficient</u>. This, essentially, has been the history of the high school diploma. And already the BLS <u>Occupational Outlook Handbook</u>** is counseling students to seek M.A.'s and Ph.D.'s in a number of fields where, until recently, a B.A. has been sufficient for entry.

B. <u>Supply and Demand for Teachers, 1970-1980</u>

The single area of unanimous agreement in occupational forecasting is that there will be a surplus of teachers in the coming decade. This results

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*The study by the BLS which has been cited does contain a special section on the "Analysis of Supply and Demand in Selected Occupations Generally Requiring Junior College Training for Entry." But it does not examine the areas of employment overlap--jobs which may be filled with someone having a two year degree <u>or</u> a four year degree.

**"The Occupational Handbook in Brief," <u>Occupational Outlook Quarterly</u>, Summer 1970, p. 7.

from several major developments. First, we are now in the midst of a decline in the absolute number of children entering and going through our elementary and secondary school system--this is simply a demographic reality. Second, a steadily increasing percentage of our college graduates have become eligible for teaching jobs. The percentage of all bachelor degree recipients who are eligible to teach has risen from about 30% in 1955 to about 40% in 1970.* Combining this with the large expansion in the absolute number of college graduates results in a truly enormous and continuing growth in the total number of eligible teachers being produced each year.

The projections with which we are familiar are in much agreement on the future demand for elementary and secondary school teachers.** They indicate a need for about 2.2 to 2.4 million active teachers for each year of the period 1971 to 1980. They are based on the assumption that the pupil-teacher ratio remains at about its present level of 22 or 23 to 1. By using data collected by the National Education Association,*** it is possible to make rather crude estimates of the annual requirement for newly graduated teachers.

In doing so, we make the following assumptions:

a) Demand for 2,400,000 teachers each year.

b) Past trends continue in the flow of teachers to and from the ranks of "active" and "inactive" teachers.

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*National Education Association, Teacher Supply and Demand in Public Schools, 1970, 1970-R-14.

**James Byrnes, on-going research at the Educational Policy Research Center, Syracuse; National Center for Educational Statistics, Projections of Educational Statistics to 1978-79.

***National Education Association, Teacher Supply and Demand in Public Schools, 1970, 1970-R-14.

This means a net decrease in the ranks of active teachers of about 5% per year.

c) The annual retirement of teachers is in the range of 20,000 to 30,000 per year in the 1970's.

We can then estimate the annual "requirements" for new teachers as being 5% of the (constant) number of teachers (2,400,000) plus an amount needed to replace retiring teachers (about 25,000). This yields an annual demand for recently graduated teachers on the order of 145,000 per year for the 1970-1980 period.

We have been unable to discover existing projections of the supply of new teachers graduating in the 1970's. Data is available on the number of new B.A. recipients who are eligible to teach: currently about 39% of all new B.A.'s are eligible. In absolute terms, this means about 291,000 potential new teachers. But this does not mean that all of these "eligibles" majored in education: in fact, about 40% of them did. Nor does it mean that all of them are even interested in teaching. Historically, about 75% of the "eligibles" have gone directly into teaching. If this were true this year, it would mean that about 218,000 new graduates would be seeking teaching jobs. If about 40% of all B.A. recipients continue to be eligible to teach, and if about 75% of these "eligibles" continue to desire teaching jobs, we would expect that the number of new, qualified B.A.'s who were seeking teaching jobs would rise from about 240,000 in 1971 to about 320,000 in 1980.

It was not until late July, 1971, that the National Education Association appears to have become aware of or alarmed by the forthcoming surplus of teachers.* Until this time, all of the NEA's language, quality criteria,

*Syracuse Post-Standard, July 28, 1971, A.P. dispatch by William J. Waugh. The NEA surplus forecasts are very similar to the ones presented in this study. This is not coincidental, since both studies used essentially the same data and methodology.

and analysis focused on a continuing teacher shortage crisis. This appears to have been a surprising oversight, since the NEA is the principal analyst of teacher supply and demand in the U.S. A simple extrapolation of their trend data for only several years ahead would have revealed the striking surplus that we are now experiencing. Reference must be made here to the "forecasting-awareness lag" referred to earlier in this study.

There is another very alarming portent about the oversupply of teachers in the 1970's. Lewis Mayhew, in his report, Graduate and Professional Education, 1980, found that institutions in the United States planned on creating 39 entirely new schools of education, while none of the existing ones were slated for elimination. Since these data are based on questionnaires filled out in 1967-68 while the higher education boom was at its zenith, and the impact of the crisis in financing higher education was not yet being felt, many of these plans may have been scaled down. As Cheit discovered in another Carnegie Commission Report, schools facing financial crises tend to take as a first step the deferral of planned new programs and facilities.* Whether that is so in this instance remains an unknown, and an updating of these data would be most useful.

It is perhaps useful here to reiterate a point made earlier. We do not in any sense expect the sizeable gap between supply and demand for teachers estimated above to come into being. Rather, this gap represents an estimate on the adjustment problem. Either the number of teachers demanded will be greater than estimated, or their supply will be less, or both. We feel certain that supply will be less than the above trend calculations estimate: the trend will change.

We are less clear about possible increases in demand, though there are indications that this might occur. For instance, increased priority

*Earl F. Cheit, The New Depression in Higher Education. New York: McGraw-Hill, 1971.

may be attached to "special" or remedial programs for the 20% of high school students who do not graduate. Most educators feel that in order to be successful such programs require fairly low pupil-teacher ratios. In addition, we may now be on the verge of a period of phenomenal growth of early childhood educational programs and new vocational educational programs. These two developments could create a sizeable increase in the demand for new teachers. Growth in adult education, correspondence courses and other such "peripheral" educational activities could constitute another source of growing demand for new teachers.* Of course, any further increase in the use of paraprofessionals could possibly further reduce future teacher demands; for that reason, increased use of paraprofessionals is less likely than it once seemed.

We do not find ourselves in a position to make quantitative estimates of these potential sources of new and renewed demand for teachers: in almost all these cases underlying trend data and program plans are unavailable. But we would be amazed if these new or expanded programs grew rapidly enough to absorb even half the trend projection of surplus teachers--a surplus which amounts to 100,000 to 150,000 surplus teachers each year for the next decade. However, we are confident that the actual production of new teachers will be less than indicated by the trend analysis, and the demand for new teachers by these new programs may do much to reduce the "residual surplus" which remains after this adjustment begins to take place.

In general, we consider cutbacks in the supply of new teachers a natural and beneficial response to the current and forthcoming surplus. But there are dangers inherent in the manner in which this reduction comes about. Schools of education, like physical and vocational education programs, have tended to be havens for the less capable students. Various efforts, such as the development of M.A.T. programs, have been made to attract the better students, who, presumably, would make better teachers. However, the better

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* See, for example, Stanley Moses, The Learning Force: An Approach to the Politics of Education, Educational Policy Research Center, Syracuse, N.Y. (March 1970).

students are also the ones that have the better opportunities in non-educational fields, and there is a danger that they will consider teaching "too risky" too pursue. The opposite effect is also possible. Schools of education, if forced to reduce the number of students they enroll and graduate, may naturally tend to make requirements more stringent, thereby discouraging the less capable students.

We are wary of making assertions here about whether the "better students" make "better teachers." Space and time do not permit a detailed examination of the literature in this area. We mention only that a major finding in a number of studies is that a teacher's verbal aptitude is one of the primary determinants of student achievement,* and this appears to be especially important in determining the achievement levels of black students:

> To paraphrase the Coleman Report, Negro children appear to respond in a particularly sensitive and positive fashion to a teacher who is skilled verbally.**

How these two opposite tendencies--disenchantment of the better students versus the possibility of raising academic standards in schools of education--balance out is unclear. But policies must be discovered which will encourage the better teacher prospects to continue to pursue teaching careers, while the total number of prospective teachers is sharply curtailed.

There is a parallel problem with regard to male teachers. School systems have recently been attempting to attract not only the better potential teachers, but also more male teachers. The rationale has been that a mixture of male and female teachers creates a better learning climate for both boys and girls. This may be especially important for disadvantaged male

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*See, for example, James S. Coleman, et. al., Equality of Educational Opportunity, pp. 290-332; and James W. Guthrie, et. al., Schools and Inequality, Chapter 4.

**Guthrie, et. al., op. cit., p. 114.

youths for whom education may appear "feminine" or "unmanly" enough without having primarily female teachers. But where teacher surpluses make entry into the profession decidedly more risky, prospective male teachers are even more likely than female candidates to avoid teaching careers, since society demands of them a greater "bread-winning" function.

We have previously commented on the relationship between a teacher surplus and the use of paraprofessionals. There are social, economic, and even educational reasons for a continuing and even growing use of paraprofessionals. It is important that the teacher surplus not become a reason for cutting back on this vital practice.

One final comment should be made on the possible "side-effects" of the teacher surplus. The recently proposed programs for early childhood education may be both quantitatively and qualitatively affected by the surplus. Current plans for major, perhaps massive, increases in early childhood learning opportunities may be given added impetus by the desire of schools of education, school districts, and teacher unions for new areas of growth. This may be especially true for the increasingly powerful teacher unions which can be expected to lobby forcefully and effectively for new employment opportunities for their unemployed members.

There are serious questions whether the new early childhood education programs can best be administered and operated as an extension of the current primary and secondary school system. School administrators may, naturally, tend to consider themselves the best qualified to manage these programs. Schools of education will be inclined to view themselves as the best suited to prepare teachers and staff for these new programs. Teacher unions, in a similar vein, may argue that "qualified" or "credentialed" teachers should provide the major instructional inputs.

These claims, of course, have some merit. But there also are strong arguments for keeping early childhood education formally distinct from the existing school system. For example, professional control and operation of

the early childhood education programs may seriously hinder parental and community involvement, and these may be elements vital for success. Professional control may also mean an undue emphasis on curriculum and preparation for later schooling, including the utilization of many educational practices which have been subjected to increasingly widespread criticism in recent years. Finally, making early childhood education part of the K-12 system might jeopardize the flexibility, experimentation, and innovation which appear to be essential for successful programs.

We are not suggesting that inclusion of early childhood education within the existing school system is necessarily unwise. However, we are pointing out that this can be done only at the cost of foregoing major alternatives. Furthermore, the teacher surplus will not inevitably lead to early childhood education becoming an integral part of the existing educational system, but the surplus will make this much more likely.

C. Ph.D. Projections

A number of studies have been made recently on the supply and demand for Ph.D.'s in the next decade. Although there are differences and disagreements among them, one theme of consensus emerges: we are confronted with a future surplus of Ph.D.'s. Our analysis does not lead us to contradict this conclusion, but it also does not lead us to support it.

Our reasoning can be summarized as follows. First, no one, to our knowledge, has suggested that Ph.D.'s will face serious prospects of unemployment. If there is a surplus of Ph.D.'s, the result will be that the "extra" Ph.D.'s will displace or "bump" their less educated peers from jobs previously not requiring that degree, meaning that the Ph.D.'s problem will be that of underemployment, not unemployment. Second, to our knowledge, there exists no evidence on the number of jobs available which would be suitable for Ph.D.'s. We do have data on the number of jobs that Ph.D.'s have taken in the past, but we have no way of telling, on the one hand, if some of these Ph.D.'s have been underemployed, or, on the other hand, if there are a large number of other jobs which could effectively use

Ph.D.'s, but were unable to because there were not enough Ph.D.'s. Third, as discussed at length previously, the problems associated with defining and empirically identifying underemployment are staggering. No one appears to have come very close to a workable solution to this problem. And this, of course, means that we cannot say very much, either way, about a prospective surplus of Ph.D.'s.

This does not mean that we can say nothing about the problem; but it does severely circumscribe the range of our conclusions. For instance, we can say quite unambiguously that if the proportion of Ph.D. candidates who desire or anticipate careers in college teaching follows past trends, there are going to be very many disappointed would-be faculty members.

We turn now to an examination of the specific forecasts of Ph.D. supply and demand.

Ph.D. Output in 1980

Listed in Table II (p. 32) are a number of projections of Ph.D. output in the year 1980.

The Syracuse EPRC has not constructed its own forecasting model of Ph.D. production. However, if forced to settle upon one, "surprise-free," or "least unlikely" projection, we would hazard the estimate that about 50,000 Ph.D.'s will be produced in 1980. This is somewhat in the middle of the range of projections listed above, tending toward the lower end. This "tendency" is based on our belief that many of the higher projections did not adequately take into account the persistance of the current financial crisis in higher education, and the strength of the "market response" of potential Ph.D. candidates to the now well publicized "glut" of Ph.D.'s. Furthermore, we feel that some downward reassessments are called for by

TABLE II
SELECTED PROJECTIONS OF Ph.D. OUTPUT, 1980*

12% per year[a]		86,000
Mayhew	high	77,000
	medium	67,500
Haggstrom	high	77,700
	medium	61,800
	low	55,000
Hall (National Research Council)		71,000
U.S. Office of Education (NCES)		62,500
Falk		48,000
Cartter	expected	48,000
	low	40,000
Dean, Reisman, and Rattner		38,500

[a]The rate of increase of Ph.D. output from 1960 to 1970. We are unaware of anyone who has suggested that this rate will continue; it is presented here as a benchmark for comparing the other projections.

*SOURCES:

Mayhew, Lewis B. Graduate and Professional Education, 1980. New York: McGraw-Hill, 1970.

Haggstrom, Gus W. "The Growth of Graduate Education in the Post-Sputnik Era." Paper presented at The Association of American Universities meeting on the Overproduction of Ph.D.'s, Washington, April 2, 1971.

Hall, Wayne C. "The Graduate Marketplace: Current Status and Future Projections." Paper presented at The Association of American Universities meeting on the Overproduction of Ph.D.'s, Washington, April 2, 1971.

U.S. Office of Education, National Center for Educational Statistics. Projections of Educational Statistics to 1978-79. Washington: U.S. Office of Education, Government Printing Office, 1970.

Falk, Charles E. "Projections of the Doctorate Population." Presentation before the 10th Annual Meeting of Council of Graduate Schools, Miami, Florida, December 2-4, 1970.

Cartter, Allan M. "Scientific Manpower Trends for 1970-1985, and Their Implications for Higher Education," for A.A.A.S. Meeting, Chicago, December 27, 1970.

Dean, Burton V., Reisman, Arnold, and Rattner, Edward, "Supply and Demand of Teachers and Supply and Demand of Ph.D.'s: 1971-1980," unpublished mimeo, June 1971 (Case Western Reserve University, Cleveland, Ohio under U.S. Office of Education Contract numbers DEC-0-71-0957 and DEC-0-71-0958).

the current and possibly future disenchantment of many undergraduates with graduate school. Once again, however, projections of graduate degree recipients have been very unreliable in the past, and the state of the art has in no substantial way improved. In this light, we would readily admit that our "estimate" of an output of 50,000 new Ph.D.'s in 1980 could prove to be far from accurate. Despite such shortcomings, such projections must be made on the assumption that unreliable forecasts are better than none.

Demand for Ph.D.'s

It is useful to divide demand for Ph.D.'s into two major categories: college and university teaching and employment in government and industry. This disaggregation, though a step in the right direction, is far from complete. Ideally, we would like to be able to project supply and demand for each academic discipline. Doing so would yield not only more specific and useful findings, but also would tend to produce more thoughtful and, perhaps, more accurate aggregate projections. The necessary data inputs for making such detailed demand projections are not currently available.* For the present, then, we are restricted to treating Ph.D.'s as a homogeneous group.

Demand for College and University Teachers

Allan Cartter has presented the most detailed picture of the outlook for employment of new Ph.D.'s in academia.** In this section we rely

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*The National Center for Educational Statistics has made a significant start on formulating projections of supply of Ph.D.'s (as well as B.A.'s and M.A.'s) in the various academic disciplines. See Projection of Educational Statistics, 1970 Edition, Table 25, p. 49.

**Allan M. Cartter, "Scientific Manpower Trends for 1970-1985, and Their Implications for Higher Education," for A.A.A.S. Meeting, Chicago, December 27, 1970.

heavily on his approach and data, save for a major quarrel with his assumption about the proportion of all new college teachers who will possess a Ph.D. He seems to assume that this proportion will remain at its current level, while we assume that it will increase fairly considerably. First, however, we will present his calculations.

Cartter begins with projections on full-time equivalent (FTE) undergraduate enrollments. These estimates are very similar to those projected by the U.S. Office of Education. He then assumes that there will be an increase of one faculty member for each additional 20 FTE students. He also assumes an annual attrition rate (death and retirement) of existing faculty of 2%. Finally, he assumes that universities, four-year colleges, and two-year colleges maintain the current percentage of Ph.D.'s on their faculties. He estimates that proportion of Ph.D.'s on faculties is 65% in universities, 44% in four-year colleges, and 15% in two-year colleges.* All of this leads him to conclude that about 92,000 new Ph.D.'s will be hired for higher education teaching positions in the period 1970-1980.

As noted above, we disagree with his assumption that the current percentage of Ph.D.'s on college faculties will only be "maintained" at its current level of about 44%. This seems especially unreasonable when one combines a picture of a surplus of Ph.D.'s (which will act to hold teaching salaries down) with an awareness of the high priority and prestige colleges attach to "upgrading" the quality of their programs by increasing the number of Ph.D.'s on their staffs. Given these two complementary considerations, we find it quite reasonable to assume that as many as 60% of all new faculty members in the 1970's will be Ph.D.'s. Even this may turn out to be a conservative estimate. But if 60% of all new faculty are Ph.D.'s, this will mean a demand for new Ph.D.'s by academia of 125,000 in the 1970's. This compares with Cartter's estimate of 92,000.

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*Ibid.

Demand for Ph.D.'s in Industry and Government

Given our assumption that there will be very limited actual unemployment of Ph.D.'s, we would be safe in saying that the number of Ph.D.'s "demanded" by industry and government will equal the total supply of Ph.D.'s minus the number employed by academia. The problem with such a forecast, of course, is that it dodges the crucial but problematic question of how many of the Ph.D.'s will be underutilized.

There is another way of looking at the demand for Ph.D.'s in government and industry. Dean, Reisman, and Rattner have found that employment of Ph.D.'s in business and government has been highly correlated with expenditures on research and development.* Using regression analysis of past trends, they found that each additional billion dollars spent on research and development was associated with an increase of 3,500 Ph.D.'s employed in industry and government. They forecasted that research and development expenditures would rise from the (expected) level of $28.8 billion in 1971 to $41.0 billion in 1980. This led them to project an increased employment of Ph.D.'s in industry and government from the (expected) level of 81,700 in 1971 to 124,300 in 1980. This means that 42,600 new Ph.D.'s would be demanded by industry and government for expansion. If there is a 2% attrition rate of Ph.D.'s employed in industry and government, an additional 20,000 new Ph.D.'s would be required for replacement. This leads to a total industry and government demand for new Ph.D.'s of about 63,000 in the 1970's.

There are, however, a number of problems with this approach. First, it is impossible to tell if the trend data, upon which this projection is

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*Burton V. Dean, Arnold Reisman, and Edward Rattner, Supply and Demand of Teachers and Supply and Demand of Ph.D.'s: 1970-1980, unpublished mimeo, June 1971 (Case Western Reserve University, Cleveland, Ohio, under U.S. Office of Education contract numbers DEC-0-71-0957 and DEC-0-71-0958).

based, have understated the "true" demand for Ph.D.'s by non-academic sources. It may be that many more Ph.D.'s would have been hired by industry and government had they been available. The 1960's could be accurately characterized as a period of shortage of Ph.D.'s in terms of the effective demand for them. If "true" demand data were available, it might well show that industry and government would have hired many more Ph.D.'s than they, in fact, did.

Second, there is the ever-present problem of assessing underutilization or underemployment. As was pointed out, an effective demand for Ph.D.'s does not necessarily mean that the skills and training of all of these Ph.D.'s are being well utilized. In fact, it is quite possible that a fair number of Ph.D.'s employed in industry and government in the 1960's were underemployed in this sense. If this was the case, then the projections by Dean, Reisman, and Rattner probably overstate the true need for Ph.D.'s in non-academic employment.

We must note, however, that the only data available indicate that there has been very little underemployment of Ph.D.'s--at least in science and engineering. A recent "Survey of Doctoral Employment" conducted jointly by the National Academy of Sciences and the National Research Council in early 1970 estimated that only about one half of 1% of recently graduated science Ph.D.'s are employed in work unrelated to their training. As discussed before, the meaning and measurement of "underemployment" are quite vague. Furthermore, the survey results are based upon reports from department chairman, not the Ph.D.'s themselves.

Summary

We have estimated that about 125,000 new Ph.D.'s will be hired by academia in the 1970's for expansion and replacement of current faculty. The Dean, Reisman, and Rattner study estimated that about 63,000 new Ph.D.'s

would be demanded by industry and government in the 1970's if past trends are reasonably stable through the coming decade. The combined demand, then, would total to about 190,000 new Ph.D.'s in the 1970's.

We also estimated that the production of new Ph.D.'s would rise from the 1970 level of about 30,000 to about 50,000 in 1980. This would mean an aggregate of about 400,000 new Ph.D.'s in the 1970 to 1980 period. On the surface this would appear to represent approximately twice the number actually required by academia, industry, and government.

We have a number of reservations about making a definitive prediction of this nature. First, as noted above, we are confident that industry and government will hire virtually all of the Ph.D.'s that are not taken by academia. What we are not at all clear about is how many, if any, of these Ph.D.'s will be underemployed. On the one hand, we forecast 275,000 new non-teaching Ph.D.'s will be produced in this decade. This is more than four times as many as is predicted by trend analysis (63,000). Even if there has been a shortage of Ph.D.'s in industry and government in the past, we find it difficult to believe that it has been of this magnitude.

On the other hand, 200,000 "extra" Ph.D.'s in the 1970's would mean about 20,000 per year. This does not seem to represent a potentially serious social problem, especially when it is realized that very few of them will be unemployed. Second, in terms of the needs of the entire society or economy, we can observe that we are discussing something around two one-hundredths of 1% of the total work force. When one considers the uncertainties of manpower forecasting, it may seem that we are here dealing with very "fine-tuning" indeed. We wonder if an increasingly knowledge-oriented economy of 80 to 90 million workers really does not have enough "give" to absorb usefully each year the services of an "extra" 20,000 highly intelligent, trained, and specialized workers. The surplus of highly educated workers to some extent creates a demand for their services.

This appears to have happened with the tremendous increase of college graduates in the past decade, and we see no reason to suspect that employers will not rearrange a number of job functions and responsibilities in order to utilize at least some of the expanded output of Ph.D.'s.

Despite these considerations, we find ourselves persuaded that there will be a fairly considerable overproduction of Ph.D.'s in the 1970's. This is admittedly a subjective judgment on our part. We basically accept the notion that the economy could in theory usefully absorb the projected production of Ph.D.'s. But the surplus is developing so suddenly and rapidly that we strongly doubt that employers in government and industry will be able to devise new jobs at sufficient speed to use these "extra" Ph.D.'s very efficiently.

The number of excess Ph.D.'s is not very large in absolute numbers, and cannot be considered a major social problem in terms of their disappointed career expectations and ambitions. However, they do represent a major problem in terms of the misallocation of public and private funds. Cartter has estimated that about $50,000 is directly invested in an individual obtaining a Ph.D.* If there were 20,000 surplus Ph.D.'s per year, they would be educated at an average annual cost of about one billion dollars, totalling to ten billion dollars for the decade! This figure, of course, represents an exaggeration of the "social waste" since most of this "surplus" would probably be finding at least a partial use for their training. Nonetheless, it seems clear that considerable waste of scarce resources would be involved.

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*Cartter, op. cit., p. 17.

V.

POLICY COMMENTS

A. Federal Policy Responses

The federal government must, naturally, wonder why it should be supporting the production of more teachers and more Ph.D.'s at a time when surpluses are anticipated shortly. A straightforward response would be to sharply reduce such support--and there are clear indications that this is being done.* But such responses can have drawbacks serious enough to make their net effect detrimental.

Manpower planning faces enormous difficulties. First, manpower projections (supply and demand) are subject to considerable uncertainty. This uncertainty increases the further projections extend into the future. Projections even three or four years into the future are extremely risky. And when one adds up the inevitable time lags involved in moving from determining that there will be a manpower problem, to defining a remedy, to implementing the remedy, and, finally, to the time required for the policy to take effect, it is possible that four or five years will have elapsed. And this may exceed the limits of our ability to frame reasonably accurate predictions of manpower supply and demand. The time lag in policy response, of course, is greater when new legislation is required. But even

*For instance, the Woodrow Wilson National Fellowship Foundation has reported an 85% cutback in federally financed first year fellowships between 1967 and 1972. In 1967, 10,972 new graduate students were supported by federal fellowship programs. By 1972, according to current budget plans, the number will be only 1,570.

in the case of effective, discretionary administrative authority, there is still at least a two-year lag in the output responsiveness of educational institutions.

Here, then, there is not only the danger that today's manpower policies attempt to solve yesterday's problems, but also that they contribute to tomorrow's problems. For example, federal efforts in the late 1960's to reduce the teacher shortage may have contributed to our current problem of a teacher surplus. It is not impossible, though it may seem so, that current public and private efforts to reduce "future" teacher surpluses will result in worsening a future teacher shortage.

It is extremely interesting to note that just at the time that it is becoming generally accepted that there is a potential surplus of highly trained manpower, there are warnings that the U.S. is falling behind other countries in science and technology. As an outstanding example, a recent issue of Technology Review contains the following report:

> American science is going downhill. America's technological superiority--its very basis of world influence and power--is gravely threatened.*

The report goes on to quote Dr. Philip Handler, President of the National Academy of Sciences, in testimony before the House Science Subcommittee:

> "Our national apparatus for the conduct of research and scholarship is not yet dismantled, but it is falling into shambles. Morale of the scientific community is lower than at any time since World War I."**

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*Technology Review, January 1971, p. 10.

**Ibid., p. 11.

These warnings and complaints appear to be the result of several developments. First, national spending priorities are undergoing some readjustments away from the heavily science and technology oriented space, military, and Atomic Energy Commission programs. And these cut-backs have not been matched by corresponding increases for research and development in the environmental, housing, and transportation areas. Second, the economy is undergoing a recession which has been more or less deliberately caused by restraint in federal expenditure growth. Research and development has shared this restraint, and has shared the consequent increases in unemployment. Third, other nations such as Japan, West Germany, and Russia have been spending very large and increasing amounts of money on research and development. If the U.S. is to maintain its supremacy, it, too must forge ahead with increasingly costly programs.

Just what this means for Ph.D. supply and demand is difficult to assess. But it seems clear that no President or Congress is likely to sit back and watch with equanimity the erosion of U.S. technological superiority. Technology simply has too many national defense and world trade implications to permit a stance of "benign neglect." The article referred to above in Technology Review was entitled "Not Like the Olympics," an apparent reference to the real stakes involved as opposed to the more purely chauvinistic ones. But the American public does possess such chauvinistic attitudes, as President Kennedy's Great Space Race made clear. Politicians can ignore these "America First" sentiments only at great peril to their careers.

If we are in fact perched upon a new "Post-Sputnik" era, the major educational-manpower effect will be to reduce substantially the projected over-production of Ph.D.'s by means of currently unanticipated increases in growth of research and development expenditures.

The "big imponderable" in all of this, from the federal government's point of view, is the effectiveness of the market mechanism which works to equate supply and demand. To our knowledge no one has constructed a detailed or accurate method for permitting supply and demand projections to interact with one another in a realistic fashion. We are in a very primitive state when it comes to assessing the relative influences of the following sorts of factors: the responsiveness of students to surpluses or prospective surpluses, the responsiveness of graduate schools and departments to surpluses, the "momentum" inherent in new programs and departments which make them relatively oblivious to market surpluses because of the costs already sunk into their creation, and the responsiveness of state legislatures and budget authorities to reports of surpluses. All of those influences must be weighed by the federal government in prescribing remedial policies. And there is very little to go on in doing so. We are reasonably confident that the various non-federal government factors will move strongly in the direction of equilibrating supply and demand. But how rapidly and effectively they will do so is unknown. And it is even possible that these non-federal government responses will be so strong as to create, in this decade, a <u>shortage</u> of trained personnel.

Another major problem in moving to curtail federal support for teachers and Ph.D.'s is to do it in a manner which will not especially burden students from low income families. For this reason, reduction of student aid assistance may be one of the least desirable methods of dealing with the problem, though it may be the most expedient. It seems to be of considerable national importance that means be found to retain higher education as a significant avenue of upward social mobility, at the same time that the rate of growth of the output of higher education is restrained.

B. Alternative Uses of College-Age Years

We have concluded that there is no clear evidence to support the contention that there exists a surplus of college graduates, at least not in the chronic, long-run sense that would imply an educational as opposed to an economic issue. Yet we think it is fair to say that there is a surplus in two other senses. First, we feel quite sure that there already exists an underutilization of the skills of the existing work force. Second, while we have no objective evidence to justify the view, we assert that if a socially legitimate alternative to college existed for those of college age, fewer persons would enroll in college. One major reason why large and increasing numbers of people attend college is that there is literally nothing else for them to do. The armed services, which were once a legitimate use of this time, appear to be losing some of that legitimacy; moreover, the implication of a 2 1/2 million-man limit on the armed services in the face of continuing increases in the college-age population, implies that this option is being closed to many. Where work was once a legitimate alternative, it is increasingly true that the jobs available to a high school graduate are not gateways to vocations, and that a person who does not attend college must while away his time washing cars, etc., before starting his true career at a later age (if ever). This means that there is an oversupply of college graduates relative to what people really want to do, and would do if given the chance.

Given that a fraction of college graduates do not appear needed in the skill sense, and that a fraction of college graduates do not really want to go to college, there seems to be a need for an alternative, career-oriented option for those years.

We suggest research into the best form or forms of what we choose to call Alternative College Age Option (ACAO), and into its probable cost. Without benefit of such research, we suggest the following:

1. ACAO should have certain properties of the armed services. It should be thought of as a self-contained segment of a person's life, a place to grow up and "become a man" (or woman). There should be some sense of adventure, or at least of departure from life's routine.

2. ACAO should have certain properties of regular employment. Most important, enrollees should be paid. They should be able to meet people whom they might marry. They should be able to acquire a variety of career skills. However, ACAO should not be looked upon primarily as a school; the acquisition of skills should be a highly important by-product, as in the armed forces.

3. ACAO should have certain properties of college. There should be some emphasis upon personal development, including late or recurrent socialization.* It is sometimes said, possibly with some exaggeration, that a major function of fraternities and sororities was to take farm boys and girls, and other graceless post-adolescents, and give them the manners and culture appropriate to college graduates. While much of this function has been given over to television, it is evident that that approach is incomplete.

4. There should be some time <u>apart</u> from work duties and from manual/physical effort for reading, lectures, discussion, etc. That is, it is our opinion that traditional book-learning and classroom learning mixes poorly with on-the-job and job-simulation learning.

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*William M. Rivera, "Recurrent Socialization," Working Paper, Educational Policy Research Center, June 1971.

5. ACAO should have certain properties of the Peace Corps. The idea of a National Service Corps has been suggested; we think a "do-good" option should be available, but the idea of national or international service, as opposed to self-development, should not be so strongly emphasized as to dominate the public image of the program. The program should be open to those who don't want to do good.

6. Though they would not be barred, the program would not be given the image of being designed especially to deal with the unemployed, with street-people or post-makers, with juvenile delinquents, with dope addicts and ex-convicts, etc.

7. One idea worth examination is the establishment of 15 to 20 units, chartered by the federal government, but organized by other institutions operating on a modified voucher plan, in competition with each other.

C. Educational Manpower

The federal government has a variety of programs affecting educational manpower. But it is not clear that the federal government has an educational manpower policy.

The fact that there is a teacher surplus and that it follows upon the heels of a teacher shortage, suggest the need for a national educational man-power policy. The development of such a policy would require three-stage research, as follows.

1. A national inventory of the teacher force. It is possible without a survey or inventory to make some plausible inferences concerning the "teacher-force"--the aggregate of (i) certified teachers engaged in teaching; (ii) certified teachers not engaged in teaching; (iii) uncertified teachers engaged in teaching; and (iv) uncertified persons who might,

under some conditions (such as a temporary though severe teachers shortage), be drawn into teaching. A national inventory of educational skills would go further, and determine the distribution of these four groups among elementary and secondary teaching and among fields of competence; and the geographic distribution, at least to highlight areas, if any, of particular abundance and shortage.

Such an inventory would give the size of the "teacher force," the sum of the four, and of the "working teacher force," which is the sum of (i) and (iii). Changes in the teacher force would occur through the output of schools of education and related educational outputs (increment), and through death and retirement (decrement). Changes in the working teacher force would occur through the same changes, together with movements of persons from (ii) to (i) and from (iv) to (iii).

Projections of the supply and demand for teachers would then include these four categories, and in cases of shortage would involve a consideration of whether and to what extent it could be dealt with by shifts among categories, rather than increasing the output of schools of education.

2. The second aspect of the policy research would be an inventory of policy instruments available to the federal government by which it can influence the size of the teacher force and of the working teacher force. An evaluation would be made of each such instrument. First is the ability to propose new legislation, particularly institutional and student aid in teacher preparation, and then, annually, the ability to seek funding for existing programs. Suffice it to say that this instrument is a crude and inflexible one, difficult to start, even more difficult to reverse. Second is the ability to influence, through leadership and moral suasion, chief state school officers and deans of schools of education. The federal government might put forth, for instance, a set of guidelines to advise schools of education of admissions policies consistent with equating the supply of

teachers with the demand. Since such a program of leadership would not seem to require statutory authorization, it is included here among currently available instruments, though it is not in fact used.

3. The third step is to determine whether additional and/or modified instruments of educational manpower policy are needed, and who should make educational manpower policy and utilize these instruments--the Commissioner of Education, a regulatory body comprised of representatives of affected groups, or some other group. This question of institutional authority would be somewhat more sensitive should the new instruments include discretionary control over the amounts and distribution of institutional and/or student aid in teacher preparation, and financial inducements to former teachers to return to teaching, etc. Should the instruments of this manpower policy be limited to leadership and moral suasion, as indicated above, the institutional locus of this "power" would not be particularly controversial.

VI.

SUMMARY

In brief, we conclude that at this time there appears to be no particular danger of a fundamental surplus in the output of B.A.'s in the 1970's. There does, however, appear to be reason to suspect an overproduction of Ph.D.'s. This overproduction is small in terms of the size of the total work force and in terms of public cost. Finally, it seems quite certain that we are about to enter a period of fundamental surplus of elementary and secondary school teachers. How rapidly individuals, schools of higher education, and state governments will respond to this imbalance remains problematic. An informed federal policy directed at ameliorating this surplus would have to be based upon some knowledge of the strength and effectiveness of these nonfederal sources of adjustment of supply and demand.

In the course of this report, we have made a number of remarks about manpower planning which may strike some as bordering on disparagement. This may to some extent reflect our own personal and subjective opinions.

Nonetheless, we feel that if a course of manpower planning is to be adopted, it should be done fully, deliberately, and well. Quick or piecemeal manpower planning should be avoided--there simply is too much room for error. Much more information than is currently available would be needed. This applies especially to the lack of disaggregated data for the various categories and disciplines of B.A.'s, teachers, and Ph.D.'s.

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